

AMENDMENTS TO THE CLAIMS:

This listing of claims will replace all prior versions and listings of claims in the application:

Claims 1-31 (Cancelled).

32. (Currently Amended) A process for manufacturing an electrochemical device comprising:

providing a cathode, an anode, and at least one electrolyte membrane disposed between said anode and said cathode,

wherein each of said cathode, anode, and the electrolyte membrane comprises at least one ceramic material, and

wherein the process of providing at least one of the cathode, the anode, and the electrolyte membrane, ~~each comprising at least a ceramic material, is produced by the method comprising the steps of~~ includes:

thermally treating an aqueous solution comprising at least one metal cation, at least one hydrosoluble ethylenically unsaturated monomer with an ester moiety, and a hydrosoluble cross-linking monomer with at least two ethylenically unsaturated ester moieties[[,]] to obtain a gel ~~provide a gel and to obtain said at least one metal cation in an oxide form;~~

calcining said gel to remove organic substances and to form at least one crystalline ~~a crystal phase of said at least one metal oxide in a nanosize powder form;~~ and

sintering said powder to provide the ceramic material.

33. (Previously Presented) The process according to claim 32, wherein the electrochemical device is a solid oxide fuel cell.

34. (Currently Amended) The process according to claim 32, wherein the method of thermally treating, calcining, and sintering is used to form the anode that contains a ceramic material selected from:

cerium oxide, manganese oxide, molybdenum oxide, titania, ceria doped with gadolinia or samaria, niobia-doped ceria, perovskites, and [[a]] cermet material comprising materials that comprise a metallic portion selected from copper, aluminum, gold, praseodymium, ytterbium, cerium, nickel, iron, cobalt, molybdenum, platinum, iridium, ruthenium, rhodium, silver, and palladium, and a ceramic portion selected from yttria-stabilized zirconia, ceria doped with gadolinia or samaria, and $\text{La}_{1-x}\text{Sr}_x\text{Ga}_{1-y}\text{Mg}_y\text{O}_{3-\delta}$ wherein x and y are 0 to 0.7, and δ is from stoichiometry; and

~~a ceramic material selected from cerium oxide, manganese oxide, molybdenum oxide, titania, ceria doped with gadolinia or samaria, niobia-doped ceria, and perovskites.~~

35. (Currently Amended) The process according to claim 32, wherein the method of thermally treating, calcining, and sintering is used to form the electrolyte membrane that contains a ceramic material selected from yttria-stabilized zirconia, ceria doped with gadolinia or samaria, and $\text{La}_{1-x}\text{Sr}_x\text{Ga}_{1-y}\text{Mg}_y\text{O}_{3-\delta}$ wherein x and y are 0 to 0.7, and δ is from stoichiometry.

36. (Currently Amended) The process according to claim 32, wherein the method of thermally treating, calcining, and sintering is used to form the cathode that contains a material selected from oxides of rare earth elements, perovskites, optionally in combination with a doped ceria, and mixtures thereof.

37. (Previously Presented) The process according to claim 32, wherein the aqueous solution comprises water or water with at least one hydrosoluble solvent.

38. (Previously Presented) The process according to claim 37, wherein the hydrosoluble solvent is selected from an alcohol, glycol, tetrahydrofuran, and dioxane.

39. (Previously Presented) The process according to claim 32, wherein the at least one metal cation is selected from lanthanum, strontium, chromium, zirconium, yttrium, aluminium, lithium, antimony, boron, cadmium, cerium, cobalt, copper, dysprosium, erbium, europium, gallium, gold, hafnium, holmium, iridium, iron, lutetium, manganese, molybdenum, nickel, niobium, osmium, palladium, platinum, praseodymium, rhenium, rhodium, rubidium, ruthenium, samarium, scandium, silver, sodium, tantalum, terbium, thorium, thulium, tin, titanium, tungsten, uranium, vanadium, and ytterbium cations.

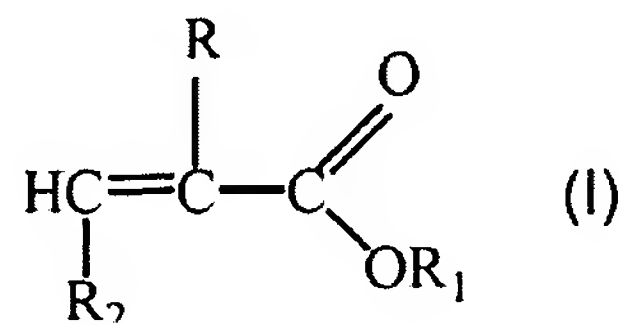
40. (Previously Presented) The process according to claim 32, wherein the at least one metal cation solution is obtained by dissolving a hydrosoluble precursor

selected from oxides, chlorides, carbonates, β -diketonates, hydroxides, nitrates, acetates, oxalates, and mixtures thereof.

41. (Currently Amended) The process according to claim 32, wherein ~~[[,]] the aqueous solution has a metal cation concentration in the aqueous solution, the at least one metal cation is in a concentration~~ higher than 0.5 mol/l.

42. (Currently Amended) The process according to claim 41, wherein ~~[[,]] the aqueous solution has a metal cation concentration in the aqueous solution, the at least one metal cation is in a concentration~~ of 1 to 10 mol/l.

43. (Currently Amended) The process according to claim 32, wherein the hydrosoluble ethylenically unsaturated monomer has general formula (I)



wherein R is hydrogen, (C₁-C₄) alkyl, aryl, or aryl (C₁-C₄) alkyl; R₁ is a C₁-C₈ hydrocarbon group containing at least one polar group selected from -COOH, -NH₂, -NHR', -N(R')₂, -OH, -OR', -SO₃H, or -SH, wherein R' is a (C₁-C₆) alkyl group; and R₂ is hydrogen, methyl, ethyl, propyl, or phenyl.

44. (Previously Presented) The process according to claim 43, wherein R' is a (C₁-C₄) alkyl group.

45. (Currently Amended) The process according to claim 43, wherein the hydrosoluble ethylenically unsaturated monomer is selected from 2-hydroxyethyl acrylate, 2-hydroxypropyl acrylate, 2-hydroxyethyl methacrylate, 2-hydroxypropyl methacrylate, 2-hydroxyethyl phenacrylate, hydroxybutyl acrylate, hydroxybutyl methacrylate, butandiol monoacrylate, 2-(2-ethoxyethoxy) ethyl acrylate, diinethylamino ethyl acrylate, and dimethylamino ethyl methacrylate.

46. (Currently Amended) The process according to claim 32, wherein the hydrosoluble cross-linking[[.]] monomer is selected from diacrylates and triacrylates wherein acrylate groups are linked to alkoxylated moieties or polyoxyalkylene linear units.

47. (Currently Amended) The process according to claim 46, wherein the hydrosoluble cross-linking monomer is polyethyleneglycol diacrylate or ethoxylated trimethylolpropanetriacrylate.

48. (Previously Presented) The process according to claim 32, wherein the aqueous solution comprises a hydrosoluble polymerization initiator.

49. (Currently Amended) The process according to claim 48, wherein the hydrosoluble polymerization initiator is α , α' -azaisobutyronitrile (AIBN), tetramethylene-ethylenediamine, hydrogen peroxide, benzoyl peroxide, dicumyl peroxide, ammonium, sodium, or potassium persulfate.

50. (Currently Amended) The process according to claim 32, wherein the thermal treatment is effected at a temperature of about 50° C to about 150° C.

51. (Previously Presented) The process according to claim 32, wherein before proceeding to the calcining step, the gel is dried to obtain a xerogel.

52. (Currently Amended) The process according to claim 51, wherein the gel is dried at a temperature of about 80° C to about 300° C.

53. (Previously Presented) The process according to claim 51, wherein the xerogel is disaggregated and subjected to the calcining step.

54. (Previously Presented) The process according to claim 32, wherein the calcining step is carried out at a temperature of about 300° C to about 1500° C.

55. (Previously Presented) The process according to claim 32, wherein the calcining step is carried out by progressively increasing temperature.

56. (Previously Presented) The process according to claim 32, wherein at least one grinding step of the powder is carried out at an intermediate stage of the calcining step.

57. (Previously Presented) The process according to claim 32, wherein the nanosize powder has a mean primary grain size lower than 20 nm.

58. (Currently Amended) The process according to claim 57, wherein the nanosize powder has a mean primary grain size of about 3 nm to about 15 nm.

59. (Previously Presented) The process according to claim 32, wherein a reduction step is effected together with the sintering step.

60. (Previously Presented) The process according to claim 59, wherein the reduction step is effected under hydrogen atmosphere.

61. (Currently Amended) The process according to claim 32, wherein the sintering of the nanosize powder is preceded by a shaping step to shape the nanosize powder into form of [[an]] the anode, the cathode or the electrolyte membrane for [[an]] the electrochemical device.

62. (Currently Amended) A process for manufacturing a nanosize oxide powder, the process comprising the steps of:

thermally treating an aqueous solution comprising at least one metal cation, at least one hydrosoluble ethylenically unsaturated monomer with an ester moiety, and a hydrosoluble cross-linking monomer with at least two

ethylenically unsaturated ester moieties[[,]] to ~~provide~~ obtain a gel ~~and to obtain~~
~~said at least one metal cation in an oxide form; and~~

calcining said gel to remove organic substances and to form at least one
crystalline ~~a crystal phase of said at least one metal oxide~~ in nanosize powder-
form.